Creator of the world's first radio and radio transmitter

ALEXANDER STEPANOVICH POPOV

BIOGRAPHY OF A SCIENTIST

Alexander Stepanovich Popov entered the history of science, technology and world culture as the inventor of wireless telegraph. He was born March 16, 1859 at the Theological Plant in the Urals, where his father was a priest. Of the six children who made up the Popov family, Alexander was the third. A certain future awaited the sons of the poor priest: serving as a deacon or priest in one of the parishes of his diocese, often in the parish of his father. But from a very young age, Alexander began to show completely different inclinations and interests. His children's games and activities sharply distinguished him from a circle of peers who were interested in grandmothers, ball games and other ordinary boys' games. Instead, he preferred to build existing models of water wheels, mills, various kinds of moving mechanisms.

Nevertheless, when the time came, A.S. Popov, due to lack of funds, was given by his father to a religious school, where training and maintenance were free. Upon graduation, he entered the Perm Theological Seminary. And here Alexander Stepanovich found time for independent studies in the exact sciences, for which he even received the nickname "mathematician" from his comrades. It is understandable that a young man with such inclinations was not attracted to the career of a priest. At the end of the seminary, A. S. Popov independently prepared for additional exams, successfully passed them and was eighteen years old, in 1877, and entered the Faculty of Physics and Mathematics of St. Petersburg University.

At the university, A. S. Popov spent all his free time in classes in a physical laboratory, doing mainly experiments on electricity. In 1881, an electric exhibition opened in St. Petersburg; A. S. Popov got a job there as an employee and, having studied all the exhibits to the smallest detail, he gave visitors thorough and clear explanations.

At the end of the course, A. S. Popov, thanks to his outstanding success and interest in physics, was left at the university to prepare for the professorship. He, who had so recently left the student bench, had in the near future to train young people himself. To do this, it was necessary to possess sufficiently deep and versatile knowledge, great erudition. The experimental side of his favorite subject - physics - was close and understandable to A.S. Popov, but theoretical physics at that time was very poorly posed at the university, and the young teacher was keenly aware of the lack of knowledge from

Website
Creator Radio-A.S. Popov
http://ur4nww.qrz.ru/popov

the university. He tried to fill this gap with independent studies. However, material insecurity, the need to simultaneously raise livelihoods and help a large family did not allow giving so much time to teaching, how much I wanted and how much was needed. It was necessary to find a way out of the situation.

In 1883, in the mine officer class in Kronstadt, a vacancy was opened for an assistant in one of the electricity sections. In those years, the mine officer class was the only higher educational institution in Russia in which electrical engineering occupied a prominent place and in which solid scientific and technical work was carried out in the direction of practical applications of electricity, especially in maritime affairs. The ability to work in electrical engineering, while studying and teaching others, as well as decent conditions of service, prompted A.S. Popov to take this place. Alexander Stepanovich soon won the sincere sympathy of his colleagues; modest, shy, completely devoid of any desire to play a prominent role, the young teacher could not cause hostility even among careerist officials. Soon he had to take on lectures. This helped him create for himself a harmonious picture of physical phenomena and, in particular, the doctrine of electricity. Consistency and clarity of presentation, the ability to animate lectures with demonstrations and examples, as well as good diction ensured A.S. Popov success. And in the future, the reports of A. S. Popov in the Physical and other societies and his lectures at the Electrotechnical Institute invariably attracted a large audience.

A.S. Popov has always been especially attracted to the field of applied, technical knowledge, but, on the other hand, the whole variety of questions of pure physics has always remained close, interesting and important for him. If his first published work, “Conditions for the most advantageous operation of a dynamo-electric machine,” was devoted to a technical question, then in the article “The Case of the Transformation of Thermal Energy into Mechanical Energy” he considers a question that is not directly related to technology. Of greatest interest to A.S. Popov were energy issues. It was this area of physics that always remained in the center of his attention. However, not a single natural phenomenon, not a single discovery or invention passed by A. S. Popov. So, for example, in connection with the solar eclipse of 1887, he, along with university comrades, enthusiastically studies everything, what was known by that time about the Sun. He takes an active part in organizing the expedition to observe the eclipse, and sets off for this purpose in Krasnoyarsk. A few years later, as soon as it became known in Russia about the discovery of x-rays by X-ray, A. S. Popov made an X-ray tube with his own hands, made a series of experiments with it and received the first photographs (radiographs) in Russia, which were used on his initiative for diagnostic purposes in the Kronstadt hospital.

During this period of time, A. S. Popov gives a course in higher mathematics and practical physics at the Marine Technical School and in the Mine Officer Class. Every year in the summer he leaves for Nizhny Novgorod, where he manages the electrical installations at the fair. For nine years, the teacher of mathematics and physics has been leading the then-largest energy economy. As a member of the Electrotechnician Society, A. S. Popov leads the construction of a number of power plants in Moscow, Ryazan and other cities. Work in this area created him the name of one of the best Russian energy specialists.

In 1893, A. S. Popov received a business trip to Chicago to an exhibition where he had the opportunity to get to know closely the latest achievements of electrical engineering and physics, in particular, the experiments of Hertz, previously known only to him in literature. Of course, the experiments of Hertz could not fail to attract his attention. Prone to analogies and generalizations, he took the discovery of new "rays of electric force" as a factor of the greatest importance, confirming Maxwell's theory. Accustomed to approach physical phenomena from the practical side, he immediately began to look for possible applications of these rays for transmitting signals over a distance.

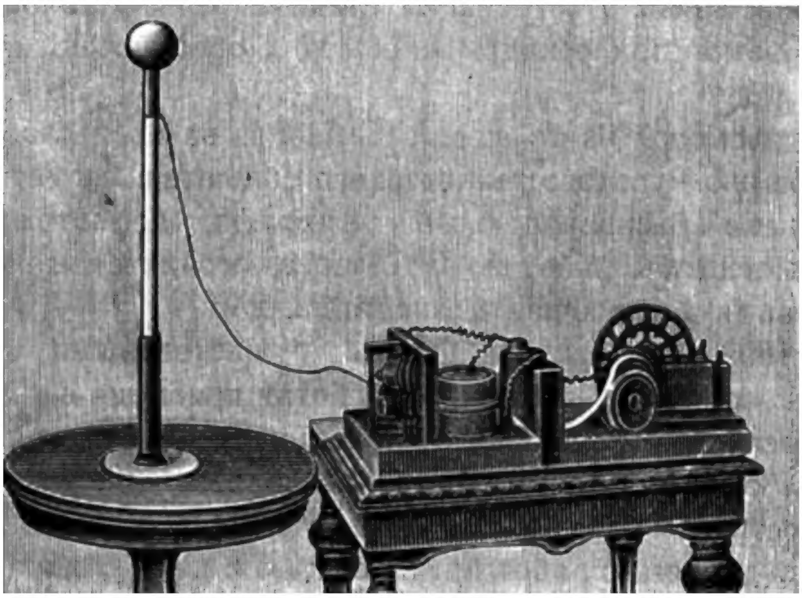
During this time, A. S. Popov gained great authority and fame as an outstanding specialist in the Maritime Department. One of the documents relating to the submission of A. S. Popov for the award of the Order of Stanislav 2nd degree and dated 1894, said: "Collegiate Assessor A. S. Popov has been a teacher in the Mine Officer Class since 1883. For these 11 years he taught practical physics, a subject that he had to independently develop in accordance with the requirements of the galvanism and chemistry program, and for which he had compiled courses. During the illness of the galvanism teacher in 1883, he completely replaced him, taking upon himself the teaching of two subjects during almost the whole winter, during which time A. S. Popov gained general respect and well-deserved fame as an excellent professor and a serious scientist who is sensitive to the development of science, whose new acquisitions he always willingly shared with the help of extremely interesting lectures and messages that he had read several times in the Mine class, the Maritime Assembly in Kronstadt, and the Maritime Museum in St. Petersburg. "The Marine Technical Committee has repeatedly used his advice and opinion on matters of electrical engineering."

The date of May 7, 1895 should be noted as having special significance in the history of radio communications and modern culture. On this day, Alexander Stepanovich Popov read a report "On the relation of metal powders to electrical vibrations" at a meeting of the Russian Physicochemical Society and demonstrated the transmission of Morse code characters without using wires. A Rumkorff coil with a Hertz vibrator connected to it was used as a transmitter, and a circuit created by A.S. Popov consisting of an antenna, coherer, relay, and a device for restoring the coherer's sensitivity was used as a receiver. A. Popov concluded his report with the words: "In conclusion, I can express the hope that my device, with further improvement, can be applied to transmitting signals over a distance using fast electrical vibrations,

In the spring and autumn of the same year, he continued his experiments in the Mine classroom and in the adjoining garden. Signal transmission was already carried out at a distance of several tens of meters. The receiver was somewhat improved in comparison with the original model and had all the essential details that were included in the wireless telegraph receivers, which were then used over the next several years. This receiver at the end of 1895 was transferred to the St. Petersburg Forest Institute meteorological station, where under the name "lightning detector" it was used to register lightning discharges at distances up to 30 kilometers.

On March 24, 1896, A. S. Popov made a report again in the Russian Physicochemical Society, clearly demonstrating the possibility of telegraphing without wires.

The receiving and transmitting devices were located in different rooms at a distance of 250 meters. A. S. Popov transmitted the first radiogram in the world, which consisted of two words - "Henry Hertz". The text of this radiogram is very indicative; he characterizes the inventor of radio itself. A. S. Popov clearly understood that his research would cause a revolution in the field of communication without wires. However, amazingly modest and devoted to science, he was ready, first of all, to pay tribute to his predecessors. The interests of science and selfless service to it were for A. S. Popov above all else.



All experiments with electromagnetic waves A. S. Popov had to produce without any special allocations. The necessary devices were made by himself or by his assistants.

Over the next year and a half, he made a very important improvement to the transmitting part of the wireless telegraph: he connected the antenna to the Hertz vibrator on one side and grounded its other half, making the transmission range noticeably increased. By this time, the Italian Marconi, who initially began to engage in the experiments of Hertz in Bologna with Professor Riga, using a transmission device and Popov's antenna, made a communication at a distance of several hundred meters, and then several kilometers. When rumors of this entered the press, the Maritime Department appropriated three hundred rubles for Popov's experiments.

Limited funds, the ability to conduct experiments only in the summer, since the rest of the time was occupied with teaching, distrust and lack of understanding of the importance of a new means of communication in higher circles — all this hindered the work of A. S. Popov.

Only three years later, in 1898, it was possible to build two complete transceiver stations with which (between the training ship "Europe" and the cruiser "Africa") wireless communication was established up to 8 kilometers. The experiments of this year confirmed the possibility of communication in any meteorological conditions and, in particular, in fog, when the usual light signaling could not be applied. In 1899, engineer Ducrete, the owner of a small factory in Russia, received an order from the Ministry of the Sea for three stations, which were ready by the fall of that year.

The Maritime Department has already understood quite well the importance of wireless communications. The constructed stations were installed on the battleships of the Black Sea squadron "George the Victorious" and "Three Saints".

However, despite the fact that A.S. Popov received the prize of the Russian Technical Society for his work at that time, in spite of all the unconditional successes of the wireless telegraph, despite the energy of Ducreta, the scope of A.S. Popov's work was limited by negligible means were very minor.

Nevertheless, 1899 was marked by two significant achievements of A. S. Popov: firstly, he developed a receiver with a telephone (a prototype of a modern detector receiver), which allowed to increase the working range; secondly, a wireless connection was established between the island of Hogland and the city of Kotka, the need for which arose in connection with the work to remove the battleship General Admiral Apraksin from the stones of the injured accident. The transmission range in this case was more than 40 kilometers. At the same time, radio telegraph first served to save lives: a message was received from Gogland about the plight of a group of fishermen carried away on an ice floe. The icebreaker "Ermak" received an order on the radio to go to sea, he soon discovered and saved all the people.

In the West at this time several powerful industrial enterprises were organized that produced radio equipment. If back in 1899, Alexander Stepanovich, who returned from abroad and visited a number of German and French radio stations there, could say that "we were not very far behind the others," then after a couple of years it was clear to everyone that the lag was growing catastrophically. Despite all the efforts of A.S. Popov, the ministerial routine, the official attitude to business, the fear of responsibility, and finally, the unfriendly attitude to inventions and inventors did not give the opportunity to either develop work in the Kronstadt workshops of the Ministry of the Sea or increase orders for the Ducreta plant.

As a result, in 1905, when, in connection with the outbreak of the Russo-Japanese war, a large number of radio stations were required, it turned out that the only way to get them quickly and in sufficient numbers was to ... order them to some foreign company.

In the early 900s, a turnaround took place in the activities of Alexander Stepanovich. In 1900, the Petersburg Electrotechnical Institute conferred upon him the title of Honorary Electrical Engineer; the following year, the Russian Technical Society elected him as its honorary member.

In the same year, he accepts an invitation to the Department of Physics at the Electrotechnical Institute, which at that time was reorganized and transferred to new purpose-built buildings on Aptekarsky Island. The new professor of physics had a lot of work to do to organize the course and laboratories. A. S. Popov devoted a lot of time and attention to this, especially since, in his opinion, the teaching of physics at an electrical engineering higher educational institution should have been significantly different from its teaching at a university. A. S Popov made a detailed work program and began to implement it.

His activity as a professor at the Electrotechnical Institute did not allow him to devote as much time to the work on the practical application of the wireless telegraph as before. The summer period of 1902 was the last when he had the opportunity to personally take part in experiments on ships.

Alexander Stepanovich, who had gained fame as an inventor and professor by this time, retained all the former features of his character: modesty, attention to other people's opinions, willingness to meet everyone and to help those in need as much as possible. In his technical work and in teaching, he always listened attentively to the opinions expressed by assistants and associates, and took into account their useful advice. But even in the relatively calm atmosphere of the Electrotechnical Institute, he had to spend a lot of energy to organize the department of physics as he considered it appropriate. The institute was under the jurisdiction of the most inert of the ministries - the Ministry of the Interior, and any living undertaking met, at best, passive resistance. And in this period, when A. S. Popov already received universal recognition, when his "career", as they were then expressed, was completed — he had a pulpit in the capital, was surrounded by friendly employees and associates — he didn't have peace of mind: he saw his beloved brainchild - the wireless telegraph - not being improved as he would like to. To the extent possible, he continues his work on wireless telegraphy (and telephony) in the laboratory of the Electrotechnical Institute; he studies electrical vibrations with the help of a Brown tube, examines wave meters, edits the publication of works on radio communications, etc. as he would have liked. To the extent possible, he continues his work on wireless telegraphy (and telephony) in the laboratory of the Electrotechnical Institute; he studies electrical vibrations with the help of a Brown tube, examines wave meters, edits the publication of works on radio communications, etc. as he would have liked. To the extent possible, he continues his work on wireless telegraphy (and telephony) in the laboratory of the Electrotechnical Institute; he studies electrical vibrations with the help of a Brown tube, examines wave meters, edits the publication of works on radio communications, etc.

The year 1905 came. Under the pressure of the awakened public! Forces, the government was supposed to grant some political freedoms, in particular, autonomy of higher education was introduced. The first director of the Electrotechnical Institute, almost unanimously elected, was Alexander Stepanovich Popov. It was at this time that Vladimir Ilyich Lenin was hiding from the police in the walls of the Electrotechnical Institute, now named after the institute.

Concerns related to the fulfillment of the director's responsible duties shook Alexander Stepanovich's already not very good health. After one very stormy explanation in the ministry, when he returned home, he suddenly felt very ill. Doctors noted a brain hemorrhage, and on January 13, 1906, Alexander Stepanovich Popov died without regaining consciousness.

After the death of A. S. Popov, the small scientific and production capabilities of the Dyukrete firm were soon brought down from the stage of the radio station of the Popova-Dyukrete system. On the other hand, the successes of the wireless telegraph in the West, the widespread advertising of new radio engineering companies, the machinations of foreign businessmen who sought to make millions using radio, gradually made the name of A. S. Popov less and less mentioned as the name of the inventor of a telegraph without wires . Only a few years later, on the initiative of the Russian Physicochemical Society, the question was raised about the role of A. S. Popov in the invention of the wireless telegraph. The Commission of the Russian Physico-Chemical Society, chaired by Professor Hvolson, created for this purpose, has done a great job. After a thorough study of the issue and correspondence with a number of foreign scientists, she established

A. S. Popov was an ardent patriot of his homeland. The closest assistant to A. S. Popov, P. N. Rybkin, recalls that when Popov's work on the use of radio communications on ships attracted the attention of foreign business circles, Popov was made several "tempting" proposals to move abroad to work. However, A. S. Popov resolutely rejected them. He said: "I am a Russian person, and I have the right to give all my knowledge, all my work, all my achievements only to my homeland. I am proud that I was born a Russian. And if not contemporaries, then maybe our descendants will understand "How great is my devotion to our homeland and how happy I am that a new means of communication has been discovered not in Russia, but abroad."

The immortal invention of A. S. Popov is one of the best achievements of modern civilization.

The most important works of A. S. Popov: The case of the conversion of thermal energy into mechanical energy, St. Petersburg, 1894; A device for detecting and recording electric vibrations (presentation of the contents of the report by A. S. Popov at a meeting of the Physical Department of the Russian Physicochemical Society on April 25, 1895 on the topic "On the relation of metal powders to electric vibrations"), Journal of the Russian Physicochemical . Society, St. Petersburg, 1896, as well as extracts from this article: ((Electricity, 1896, vol. 17, No. 13-14, Meteorological Bulletin, 1896, vol. 6, No. 3; On telegraphy without wires , "Electrotechnical Bulletin", 1897, IV; One of the applications of the coherer, "Electrician", 1897, v. 4E; Wired without wires, "Proceedings of the 1st Electrotechnical Congress 1899-1900", St. Petersburg, 1901, v. II.

Literary sources about A.S. Popov:

Berg A. I., A. S. Popov and the invention of radio, L., 1935;
Lebedinsky V.K., Invention of a wireless telegraph, M., 1925;
Kudryavtsev-Skif S., Russian fleet - the cradle of radio, M. -L., 1939;
50 years of Hertz waves (ed. Ed. V.K. Arkadyev), ed. USSR Academy of Sciences, M.-L., 1938;
Berg A.I. and Radovsky M.I., Alexander Stepanovich Popov (on the 50th anniversary of the invention of the radio), M.-L., 1945;
Golovin G.I., A. S. Popov — inventor of radio (Life and activity), M., 1945;
Rybkin P.N., Memoirs of Popov, M., 1945.

The site was created by the **ur4nww.qrz.ru** team in 2009. Using materials reference to the site is obligatory.